

THE WEATHER AND CIRCULATION OF APRIL 1968

Cool in the West and Warm in the East

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1. MEAN CIRCULATION

Marked changes in 700-mb. anomalous height from March to April 1968 (fig. 1) accompanied retrogression of several long wave features at middle and high latitudes over the Pacific and North America. The greatest change occurred in the eastern Pacific where heights increased by as much as 180 m. As the westerlies here moved northward in April the deep trough which had been over the eastern Pacific in March (fig. 1 of [1]) retrograded to the mid-Pacific and was replaced by a strong middle latitude ridge (fig. 2 and 3). At the same time the full latitude

trough along the east coast of Asia in March weakened considerably in April and became a lower latitude feature.

Retrogression also occurred over North America, primarily in response to strong ridging in the eastern Pacific. As the ridge over the Canadian Rockies moved to the coast a deep trough developed over mid-North America, tilting strongly to the southwest (fig. 1 and 2). Middle and high latitude portions of this trough had been along the East Coast and mean Low in Baffin Bay in March. A ridge prevailed over the eastern United States in April, replacing cyclonic flow of the previous month.

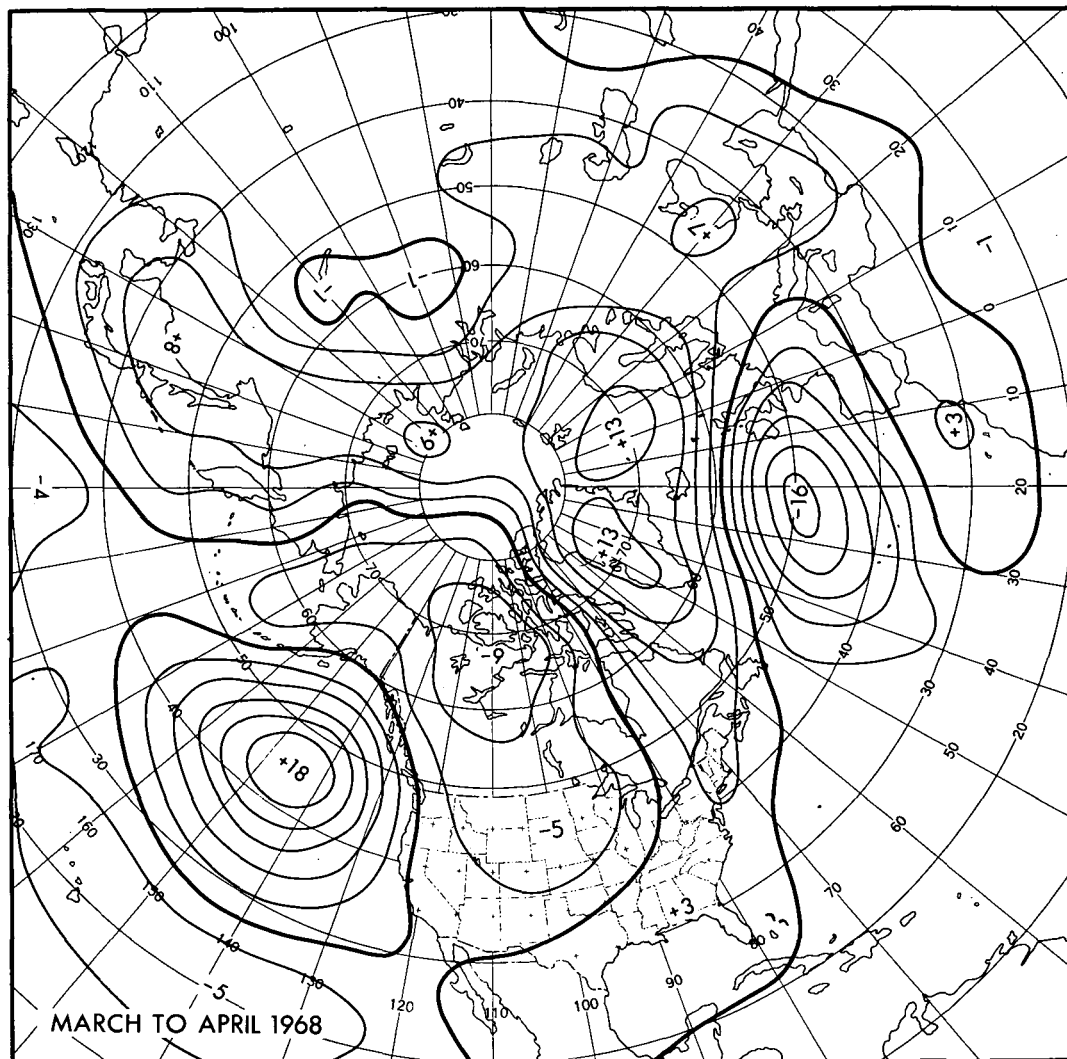


FIGURE 1.—Mean 700-mb. height anomaly change (decimeters) from March to April 1968.

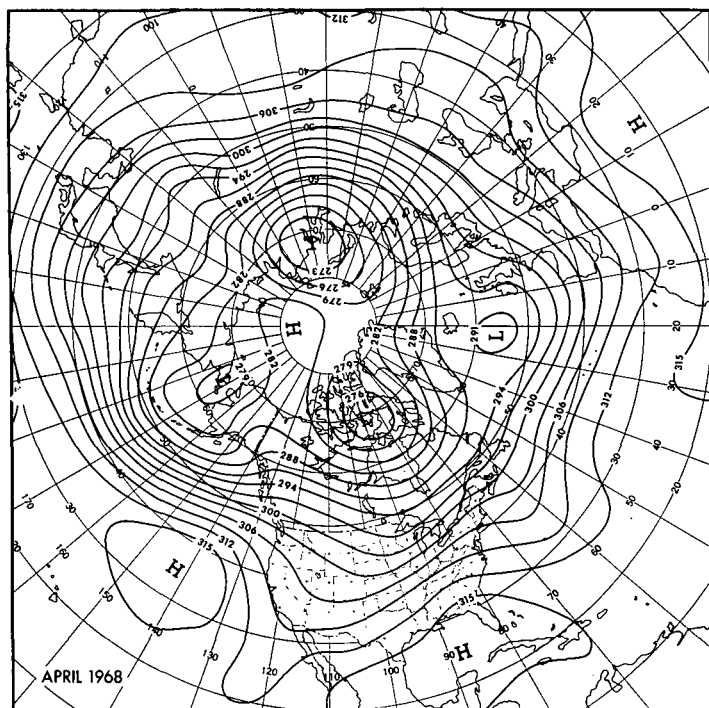


FIGURE 2.—Mean 700-mb. contours (decameters) for April 1968.

A major change to a blocking circulation occurred in the Atlantic where 700-mb. anomalous heights fell as much as 160 m. at middle latitudes, and increased up to 130 m. at high latitudes. The principal storm track was displaced south of normal by blocking with the deep eastern Atlantic trough bringing considerable storminess to western Europe.

The circulation over Asia was dominated by fast westerlies associated with a deep Low at high latitudes. Strongest mean winds over the Northern Hemisphere, however, were observed in the mid-Pacific where speeds were 20 m./sec., 8 m.p.s. above normal.

2. TEMPERATURE

Lower than normal temperatures prevailed in the West in April while much of the East was warm (fig. 4). Below normal temperatures represented a marked cooling from March [1] and were in direct response to the strong ridge over the eastern Pacific and the trough over the mid-United States. Cool Pacific air masses advected southward by stronger than normal northerly anomalous flow were largely responsible for the cool weather. Greatest temperature departures from normal were from 4° to 6°F. in the Rocky Mountain States and Great Basin. No records for mean monthly temperature were established in April over the Nation, but at Winnemucca, Nev., the average minimum temperature was the lowest of record.

Warm conditions in the East were associated with the mean ridge and above normal 700-mb. heights. Temperature departures from normal were generally small, but in the Northeast and Great Lakes Region they were 4°–5°F. (fig. 4).

3. PRECIPITATION

Cyclonic activity related to the mean trough in mid-Nation brought up to twice normal precipitation to the

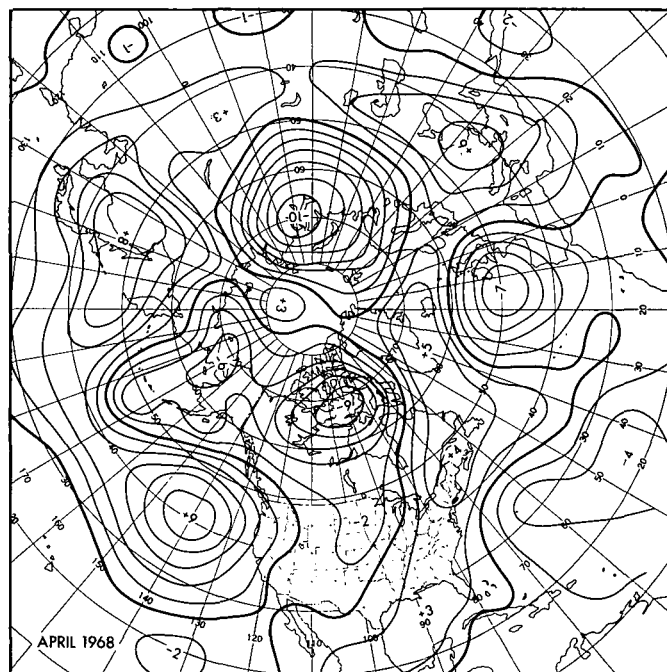


FIGURE 3.—Departure from normal of mean 700-mb. height (decameters) for April 1968.

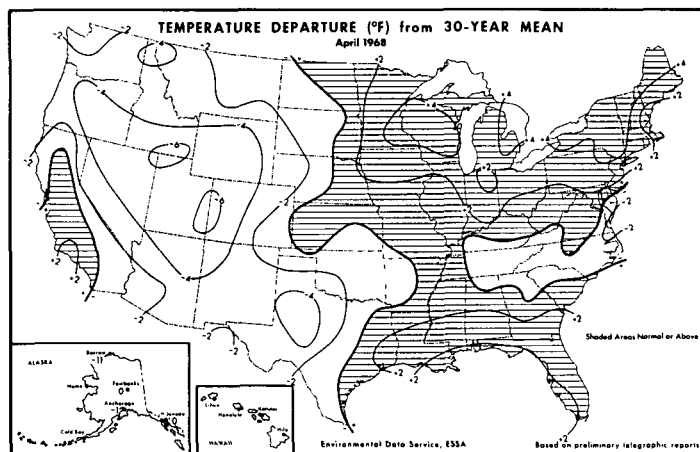


FIGURE 4.—Departure from normal of average surface temperature (°F.) for April 1968 (from [2]).

Upper Mississippi Valley and eastern portions of the Northern Great Plains (fig. 5) with amounts generally 4 in. or more. Another area of heavy precipitation extended from the eastern parts of Oklahoma and Texas to the southern Appalachians where monthly totals were 4 to more than 8 in.

Rainfall in the East Coast States beneath the mean ridge was mostly below normal. It was particularly dry in Florida as amounts were generally less than an inch. April was the fourth consecutive dry month there and drought conditions were becoming serious. Abundant sunshine accompanied the warm rather dry conditions in the Northeast. Many cities reported that the percentage of possible sunshine was 20 to 30 percent above normal, unusually high for April.

Except for portions of the Rocky Mountain States and the Northwest Coast, rainfall in the West was generally below normal, a reflection of stronger than normal north-

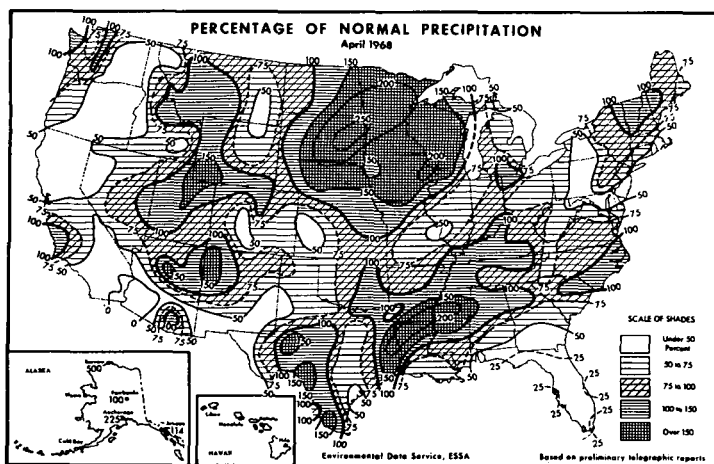


FIGURE 5.—Percentage of normal precipitation for April 1968 (from [2]).

erly anomalous flow at 700 mb. (fig. 3). Many areas in the Far West and Southwest received less than 50 percent of normal, and southwest Arizona reported no measureable precipitation. The San Francisco, Calif., area was unusually sunny this April. The 95 percent of possible sunshine recorded was the greatest since records began in 1891. This figure also equals February 1964 for the greatest sunshine percentage of any month.

4. WEEKLY WEATHER AND CIRCULATION

APRIL 1-7

The circulation in early April over the United States was very similar to that for the entire month (compare fig. 6A with fig. 2). Patterns of temperature anomaly and precipitation were also similar. Cold air pushed into the Far West early in the week, gradually spreading eastward in the rear of a severe spring storm. The temperature at Casper, Wyo., fell to 1°F. on the 3d, which equaled the previous daily record, and to 5°F. on the 4th, a record for the date. Daily temperature records were also established at Omaha, Nebr., on the 5th (9°F.) and at Cleveland, Ohio, on the 6th (21°F.).

The storm, which moved from the Great Basin across the Central Plains and Lakes Region, was one of the weather highlights of the month. Heavy snow and strong winds created blizzard conditions from the 2d to the 4th across the Northern Plains. Greatest snowfall ranged from 10 to 20 in. in northern Nebraska. Moderate to heavy rains accompanied the storm in the Central States; severe local storms struck some areas, with tornadoes being reported in Iowa and Kentucky. The cold front with this storm system penetrated only to northern Florida, thus helping to keep the peninsula virtually rainless for the week.

APRIL 8-14

During the second week a blocking High appeared north of Alaska and the eastern Pacific anticyclone strengthened and moved northward (fig. 7A). The belt of strong westerlies between these two systems also spread across mid-North America. The western trough weakened considerably while the ridge off the South Atlantic Coast

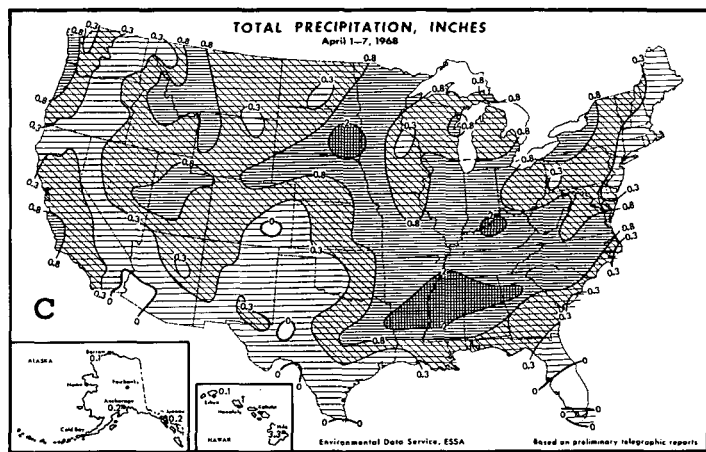
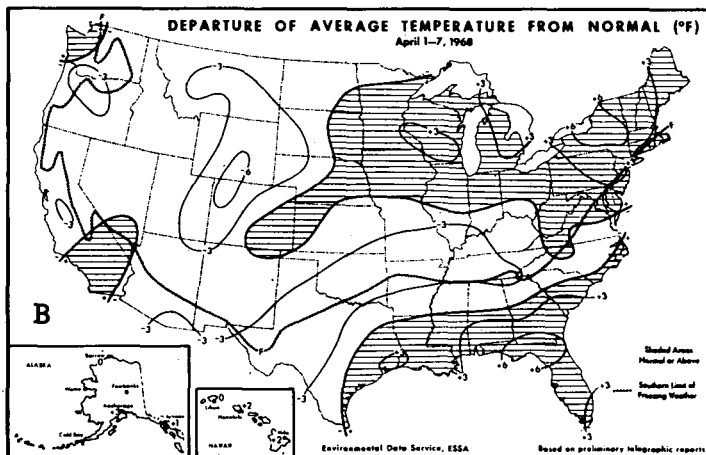
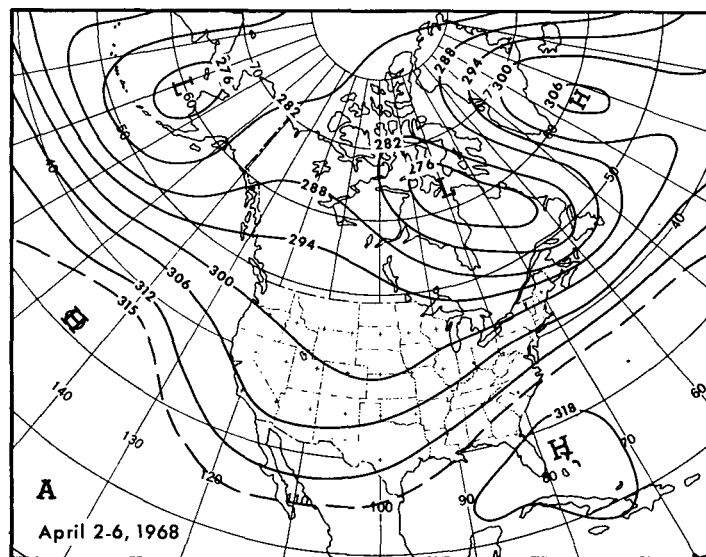


FIGURE 6.—(A) Mean 700-mb. contours (decimeters) for Apr. 2-6, 1968; (B) departure of average surface temperature from normal (°F.), and (C) total precipitation (in.) for week of Apr. 1-7, 1968 (from [2]).

retrograded. Above normal 700-mb. heights prevailed over the entire Country along with warmer than normal temperature in most areas.

This was the warmest week of the month as only the Northwest and part of the Southwest had temperatures slightly below normal (fig. 7B). Record daily high temperatures were observed at many cities in the Upper Great Plains and Lakes Region on the 11th and 12th.

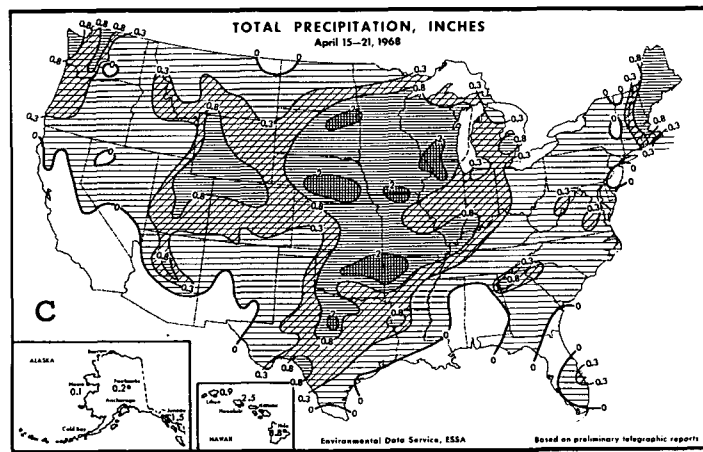
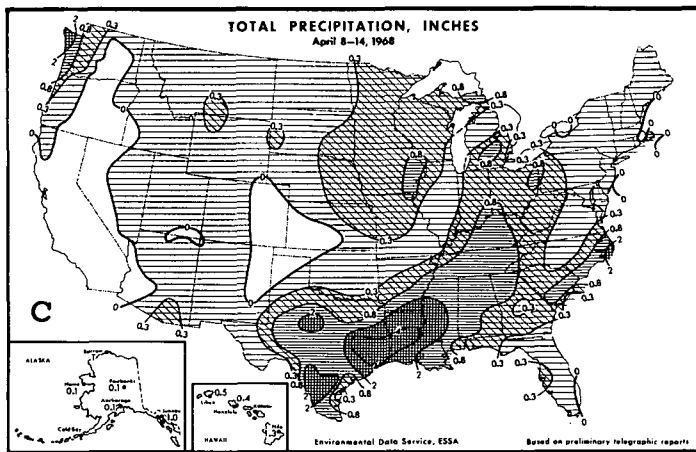
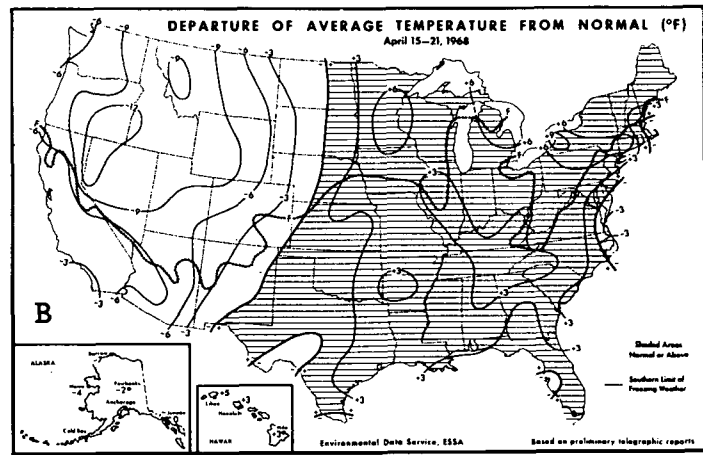
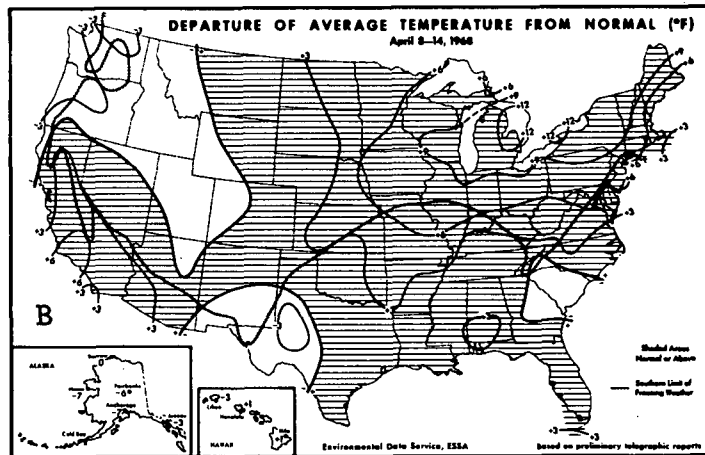
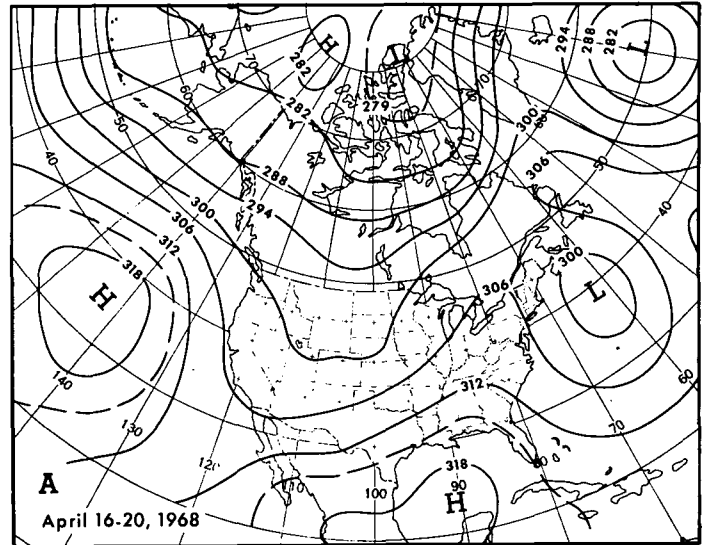
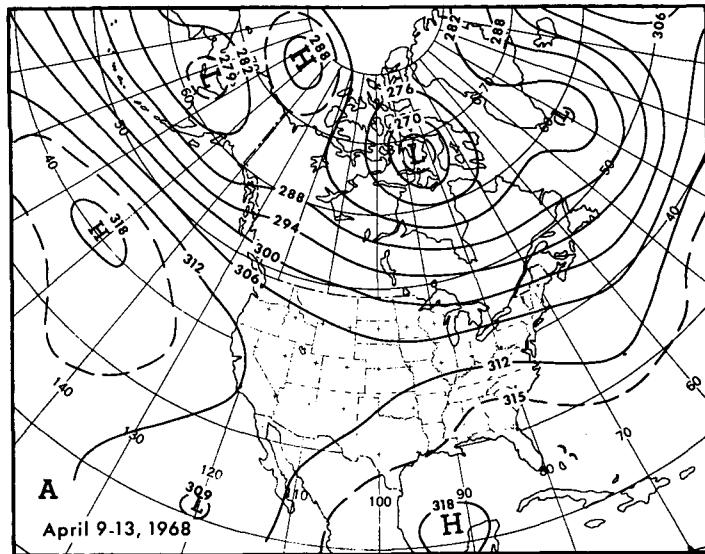


FIGURE 7.—Same as figure 6, (A) for Apr. 9–13, 1968; (B) and (C) for week of Apr. 8–14, 1968 (from [2]).

FIGURE 8.—Same as figure 6, (A) for Apr. 16–20, 1968; (B) and (C) for week of Apr. 15–21, 1968 (from [2]).

Some of these were Bismarck, N. Dak. (84°F.); Sioux Falls, S. Dak. (85°F.); Omaha, Nebr. (87°F.); Sioux City, Iowa (89°F.), all on the 11th; and Marquette, Mich. (85°F.), on the 12th. The latter was also the highest temperature registered so early in spring. Continued building of the eastern Pacific ridge led to marked cooling in the Far West late in the week. Daily minimum temperature records were established on the 13th at Pocatello and Boise, Idaho, with 19°F., and at Medford, Oreg.,

with 26°F. This was also the lowest temperature so late in the season at Boise.

Much of the Nation received only light to moderate precipitation (fig. 7C) as the westerly circulation and lack of anomalous flow from a major moisture source region inhibited rainfall. Principal exception was the western and central Gulf States where anomalous flow from the Gulf of Mexico, the trough over the Southwest, and a slow-moving cold front combined to produce heavy rains

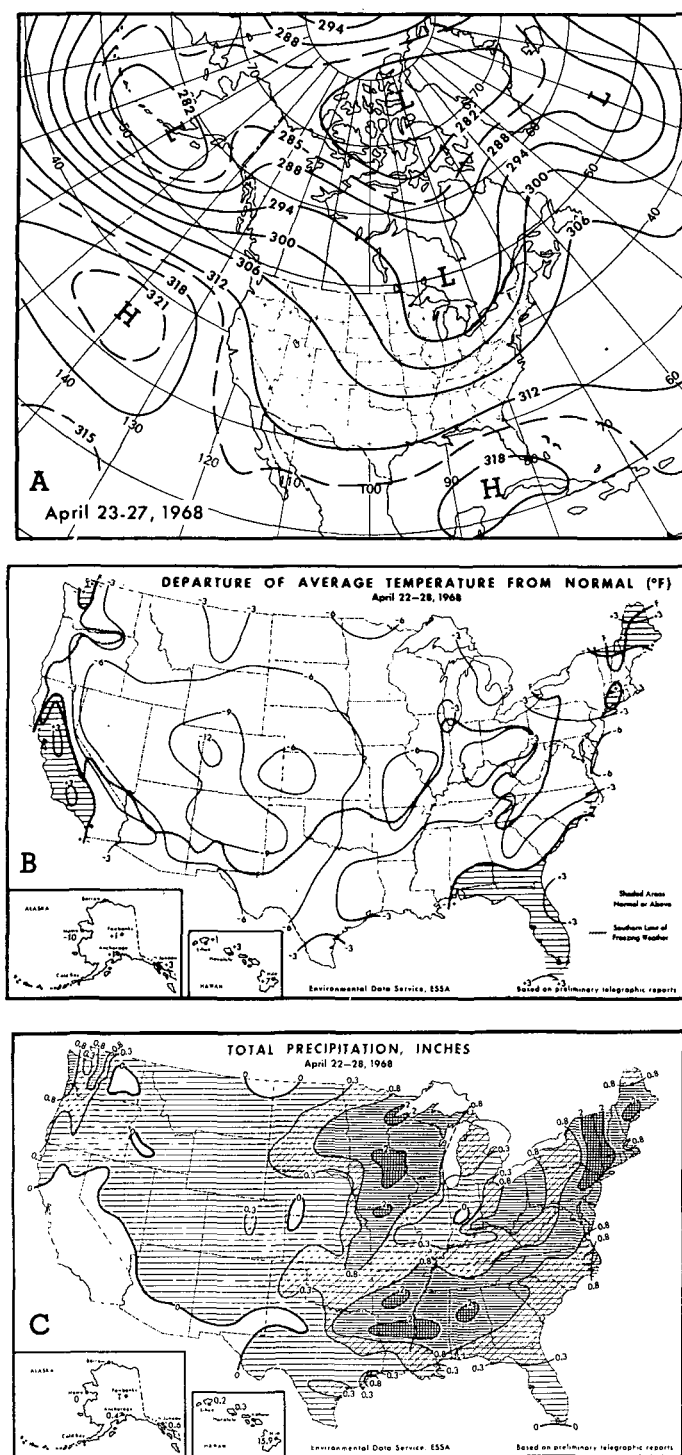


FIGURE 9.—Same as figure 6, (A) for Apr. 23-27; (B) and (C) for week of Apr. 22-28, 1968 (from [2]).

the first half of the week. Much of this was associated with thundershowers and caused extensive flooding of lowlands in Texas and Louisiana. Heaviest amounts ranged from 5 to 10 in. with 7.24 in. at Port Arthur, Tex., on the 8th and 9th.

APRIL 15-21

Marked amplification of the circulation the third week led to a deep trough in the West and a strong ridge over the East (fig. 8A). As a result pronounced cooling occurred in the West while the East continued warm (fig. 8B).

Temperatures averaged as much as 12°F. below normal in parts of the Central Plateau. Records were equaled for lowest temperature so late in spring at Pocatello, Idaho, on the 18th (17°F.) and at Phoenix, Ariz., on the 19th (37°F.). In addition, daily temperature records were established on the 17th and 21st at Medford, Oreg., with 25°F. and 27°F., respectively.

The large amplitude flow and temperature contrast favored the heavy precipitation and severe weather which occurred in many areas from the Rockies to the Mississippi Valley (fig. 8C). A storm moved eastward from the Great Basin near midweek and brought snow to the Basin and central and southern Rocky Mountain States. Some of the heavier falls were at Lander, Wyo., with 11 in. and at Flagstaff, Ariz., which reported 7 in. Tornadoes and severe thunderstorms struck most states in the Great Plains and Mississippi Valley during the week. The most destructive of these was the tornado at Greenwood, Ark., which killed 14 persons and injured 270.

Except for mostly moderate precipitation in the Far Northwest, little or no rain fell in the Pacific Coast States and Far Southwest. Dry conditions also prevailed beneath the ridge in the East.

APRIL 22-28

Progression of the long waves occurred from the third to the fourth weeks as the trough over the West moved to the Central States (fig. 8A and 9A). The East cooled to below normal temperature while the Far West warmed (fig. 9B). Even so, only part of California had above normal temperatures. As a result this was the coolest week of the month over the Nation. At New Orleans, La., a temperature of 40°F. on the 25th was the lowest so late in spring. Daily low temperature records were also established at such widely scattered cities as Fresno, Calif., on the 21st and 22d; Pocatello, Idaho, on the 21st, 22d, and 23d; El Paso, Tex., on the 24th; and Raleigh, N.C., on the 25th and 26th. Pronounced warming spread across the Northern Plains at the end of the month with Billings, Mont., reporting 84°F. on the 30th, a daily record.

Moderate to heavy rains accompanied the advancing trough over the eastern half of the Nation as the West became drier (fig. 9C). Heaviest amounts of 2 in. or more fell in the Upper Mississippi Valley, central Gulf States, and Northeast. The first substantial rainfall since March 23 fell in the Middle Atlantic States and was very beneficial. Tornadoes struck in Ohio and Kentucky on the 23d, resulting in several deaths. Only scattered showers fell in Florida, however, and offered little relief from the drought.

REFERENCES

1. R. R. Dickson, "The Weather and Circulation of March 1968—A Warm Month With Increasing Westerlies," *Monthly Weather Review*, vol. 96, No. 6, June 1968, pp. 309-404.
2. Environmental Data Service, ESSA, *Weekly Weather and Crop Bulletin*, vol. 55, No. 15-19, Apr. 8, 15, 22, 29, May 6, 1968, pp. 1-8.